

Appendix B

Guidelines for Conducting an ES&H Evaluation

This appendix is organized into five tables to help readers plan an activity from an ES&H perspective, select the appropriate controls, and determine whether a safety procedure is needed. It provides guidance for (1) systematically identifying the hazards in a facility or activity, hazardous materials, and environmental concerns; and (2) ensuring compliance with DOE-prescribed standards, other ES&H regulations, and the requirements for maintenance and quality assurance of safety systems. The hazards in a facility, along with the controls selected to address them, should be documented in either an FSP or OSP.

The tables in this appendix can also be used to help Laboratory personnel perform ES&H evaluations. However, they should only be used to the extent the reader finds them helpful. (For the benefit of users of this appendix, a copy of these tables is available through Open LabNet. If necessary, contact your ES&H team for information on how to access the tables.) Use of the tables is not a substitute for careful consideration of the ES&H aspects of an activity by the Responsible Individual. An ES&H evaluation should be a joint effort between the individual responsible for an activity and the area ES&H team. The ES&H teams include specialists in industrial hygiene, industrial safety, radiation safety (health physics), environmental protection, and other disciplines. These individuals are familiar with the ES&H requirements in Laboratory manuals and can provide guidance on the required and effective controls for the hazards and environmental concerns identified.

If these tables are employed, the Responsible Individual should print his/her name at the bottom of each table so that he/she can be contacted if there are any questions.

B.1 Instructions for Table B-1 (Energy Sources and Hazardous and/or Radioactive Materials)

1. Specify the energy sources and the hazardous and/or radioactive materials (see list on the following page) that apply to the operation. Enter this information in column 1.
2. In column 2, specify the hazardous condition(s) associated with the energy source and quantify the hazard level (e.g., high-voltage, 1000 V, and 2 A). List the quantity of hazardous and/or radioactive material to be used.
3. Place an upper boundary on the potential consequences in column 3, assuming there are no controls on the operation (e.g., toxic spill or discharge, lethal electrical shock [from a high-voltage energy source], or acid burns and eye splash [from nitric acid]). The "Potential consequences" column should also include the potential for exceeding the hazardous material limits of the Facility Safety Analysis Report and/or document.

Electrical sources

Capacitors
Batteries
Static electricity
High-current sources
High-voltage sources

Steam

Flames
Solar
Friction
Chemical reaction
Spontaneous combustion

Motion sources

Pulleys, belts, gears
 Shears, sharp edges, pinch
 points
 Vehicles
 Mass in motion

Gravity-mass sources

Falling
 Falling objects
 Lifting
 Tripping, slipping
 Earthquakes

Pressure sources

Confined gases
 Explosives
 Noise
 Chemical reactions
 Stressed mechanical systems

Cold sources

Cryogenic materials
 Ice, snow, wind, rain

Heat sources

Electrical

Chemical sources

Corrosive materials
 Flammable materials
 Toxic materials
 Radioactive materials
 Carcinogenic materials
 Reactive materials
 Teratogenic materials

Radiant sources

Infrared sources
 Intense visible light
 Lasers
 Ultraviolet (UV)
 Magnetic and electric fields
 Microwave and radio frequency
 X rays
 Ionizing radiation (alpha, beta, gamma, and
 neutron)
 Nuclear criticality

Biological sources

Blood-borne pathogens
 Infectious diseases
 Animals

Table B-1. Energy sources and hazardous and/or radioactive materials.

1	2	3	4	5	6	7	8
Hazardous/ radioactive materials; energy sources	Hazardous conditions	Potential conse quences	Applicable H&SM ^a Chap. and HC ^b discipline	Required controls	Required training (frequency)	Safety procedure required?	Medical surveillance

^a Health & Safety Manual

^b Hazard Control Department

Responsible Individual

4. Identify the chapter and/or supplement of the *Health & Safety Manual* applicable to the energy source, or identify the appropriate discipline member from the Hazards Control Department or the Environmental Protection Department (EPD) for your area ES&H team. Enter this information in column 4.
5. Read the appropriate chapter and/or supplement of this Manual, and record in column 5 the required controls or those recommended by the discipline member from the Hazards Control Department or EPD.
6. Record the training required by the *LLNL Training Program Manual* in column 6.
7. If this Manual requires a safety procedure or if the hazards and its controls must be documented in a safety procedure, answer "Yes" in column 7. For example, if the hazardous material is beryllium, Supplement 21.10 states that a safety procedure is required if the operation involves dispersible forms (dust, fines, or powders) of beryllium.
8. Consult the ES&H team to determine if medical surveillance or personnel monitoring is required for any of the hazards listed in column 1. In column 8, answer "Yes" if medical surveillance is required.

B.2 Instructions for Table B-2 (Environmental Concerns)

1. Using the *Environmental Compliance Manual* and the list below, identify the environmental concerns associated with the activity. Enter those concerns in column 1 of Table B-2. This list contains examples of items to consider.

Air pollutants

Emission sources

Abatement devices

Wipe cleaning

Water pollutants

Sanitary sewers

Storm sewers

Retention tanks

Spill control

Soil pollutants

ESI/EIM mitigation measures

Wetlands

Flood plains

Cultural Resources

Endangered species

Waste generation and minimization

Waste management

Radioactive waste

Hazardous Waste

Mixed waste

Waste accumulation areas

Satellite accumulation

2. In column 2, identify the potential material released (e.g., Freon) or waste types (radioactive, hazardous, or mixed). Quantify the amount of hazardous materials available for release (source term) in units of mass per time (e.g., 500 gal./month or 5 L/week). Explain why material or waste generation is irregular or infrequent (e.g., 3 h/day at 0.005 L/h). Hazardous constituent contamination in solid or liquid wastes and in liquid or air emissions is usually expressed in mg/kg, mg/ml, or mg/m³.
3. State the potential environmental impact in column 3, assuming no controls on the operation (e.g., "Discharge through the sanitary sewer could exceed permit levels to the Livermore Water Reclamation Plant and could result in a hazardous or radioactive material release to the environment."). Consult the environmental analyst or your area ES&H team to assess potential impacts on the environment.

Table B-2. Environmental concerns.

1	2	3	4	5	6	7
Environmental concerns	Materials and quality	Potential impact	LLNL guidance documents	Required controls	Training required (frequency)	Included in safety procedure

Responsible Individual

4. Consult the environmental analyst for your area ES&H team for assistance in identifying the applicable LLNL guidance documents. Note these in column 4.
5. From the guidance provided by your area environmental analyst, list in column 5 the required or recommended controls to eliminate and/or reduce pollution. Similarly, list the controls to manage wastes.
6. Use the *LLNL Training Program Manual* or obtain guidance from EPD on required environmental training and repeat frequency. Enter this information in column 6.
7. In column 7, state if the concern must be documented in a safety procedure.

B.3 Instructions for Table B-3 (Codes, Standards, and Regulations)

NOTE: Activities that have an adverse environmental impact may require permits from Federal or State regulatory agencies. Because the preparation and approval process for safety and environmental documents is time consuming, the need for such documentation should be determined early in the project planning phase to avoid delays in schedule.

1. In column 1 of Table B-3, identify aspects of your operation that might require permits, approval, or reporting. Consider Local, State, and Federal requirements. For assistance with completing Table B-3, contact the Operations and Regulatory Affairs Division of EPD, your area environmental analyst, or your Assurance Manager.
2. In column 2, identify the type of permit, approval, or reporting required.
3. In column 3, identify the regulatory agency requiring the permit, approval, or report.
4. In column 4, identify the actions necessary to obtain the permit or approval, or to file a report.

Table B-3. Codes, standards, and regulations.

1	2	3	4
Hazardous material condition	Types of permit, report, approval required	Agency requiring permit, approval, report	Actions to obtain permit, approval, report

Responsible Individual

B.4 Instructions for Table B-4 (Maintenance of Safety Systems or Equipment)

1. In column 1 of Table B-4, identify systems and/or equipment associated with the activities that are important to safety and protection of the environment. Failure to provide for maintenance of these systems or equipment could significantly increase the risk of injury, illness, loss, or damage of programmatic equipment, or impact the environment (e.g., emergency power, radiation and fire alarm systems, fire suppression systems, evacuation alarm, and retention tanks). Additional guidance is provided in Section 4 of the *LLNL Maintenance Program Guidance Manual*.
2. In column 2, identify the individual (by job title) who is responsible for conducting the required maintenance.
3. In column 3, reference facility-specific maintenance manuals or pertinent sections of the *Plant Engineering Standards Manual*.

Table B-4. Maintenance of safety systems or equipment.

1	2	3
Safety systems or equipment	Who is responsible	References

Responsible Individual

B.5 Instructions for Table B-5 (Quality Assurance of Safety Systems and Environmental Protection Equipment)

1. In column 1 of Table B-5, identify activities, systems, and equipment whose failure could adversely impact the health and safety of workers or the public, result in loss or damage of equipment, or cause damage to the environment. Failure to provide proper quality assurance (QA) of these activities, systems, and equipment could significantly increase the risk of injury, illness, loss, or damage of programmatic equipment, or impact the environment (e.g., emergency power, radiation and fire alarm systems, fire suppression systems, evacuation alarm, and retention tanks).
2. In column 2, identify the individual (by job title) who is responsible for the QA aspects of the activity.
3. In column 3, reference facility-specific QA manuals or pertinent sections of the *Plant Engineering Standards Manual*.

Table B-5. Quality Assurance of Safety Systems and Environmental Protection Equipment.

1	2	3
Activities, systems, or equipment	Who is responsible	References

Responsible Individual